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Utilization Research & Development Division

Publications and Patents

July - December 1967

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**Agricultural Research Service
United States Department of Agriculture**

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Northern Utilization Research and Development Division
Agricultural Research Service
United States Department of Agriculture
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INTRODUCTION

The Congress in 1938 authorized four regional laboratories, now known as Utilization Research and Development Divisions, to conduct basic and applied research designed to expand, improve, and develop through science and technology the utilization of American farm crops. The need and importance of such research arise because the farmer is not organized to carry on modern scientific research to maintain old markets for his products and to create new ones. Since their inauguration, these laboratories have contributed much basic knowledge of the chemical composition and physical properties of farm commodities and have applied this knowledge to create new or improved products and processing technology that have enhanced utilization of many farm commodities.

The Northern Utilization Research and Development Division is responsible for research on industrial utilization of the cereal grains -- corn, wheat, barley, grain sorghum, and oats; and the oilseeds--

soybeans and flaxseed. Except for wheat and barley, the research includes food and feed uses of these crops. In the Department's program of research on replacement crops, the Northern Division conducts all screening and characterization studies on uncultivated plants and their components. It is also responsible for more intensive research on new oilseeds containing erucic acid and on new gum and pulp fiber plants. In addition to its internal program of research, it carries out work through domestic contracts and grants and conducts related research abroad under grants or contracts involving Public Law 480 funds.

The research investigations at the Northern Division are supported by more than 450 people, about one-half of whom have professional status. This body of highly trained men and women with specialized knowledge in various disciplines are responsible for the scientific publications and patents listed here.

REQUEST FOR INFORMATION

The results of the research of the Northern Utilization Research and Development Division are published regularly in the technical literature, and public-service patents are secured to cover patentable inventions and discoveries (see page 35). As a convenient guide to our publications and patents, a list with abstracts is published semi-annually. The abstracts describe the current research and indicate the progress achieved. Further information on any of the developments, as well as earlier technical papers, may be obtained by writing us.

In conformance with the policy of the Department of Agriculture, Northern Division publications are available to scientists and other specialists, librarians, representatives of the press, and others interested.

Requests for specific reprints should be by number and addressed to the Northern Division.

Those titles marked with an asterisk [*] are not available for distribution.

Most of the publications are in journals that are available in libraries. Photographic copies of most journal articles on research at this Division can be purchased from the National Agricultural Library of the U. S. Department of Agriculture, Washington, D. C. 20250.

No publications will be sent regularly in response to foreign requests unless exchange arrangements have been made with the Director of the National Agricultural Library.

Copies of previous lists of publications and patents are available upon request.



[Compiled by reprint order number. Numbers marked (*) do not have reprints available for distribution.]

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Oilseeds:

2232, 2233, 2242, 2243, 2267, 2269, 2276, 2278, 2287, 2289*

Pulping Crops:

2261

- 2214 ● **Edible Soybean Protein Products. A List of Publications and Patents for 1966**
North. Util. Res. Develop. Div.
U.S. Agr. Res. Serv., ARS-71-26-5, 3 pp. June 1967. [Processed]
- 2215 ● **Chemically Modified Oil Products and Industrial Uses. A List of Publications and Patents for 1966**
North. Util. Res. Develop. Div.
U.S. Agr. Res. Serv., ARS-71-27-5, 3 pp. June 1967. [Processed]
- 2216 ● **Industrial Uses of Proteins. A List of Publications for 1966**
North. Util. Res. Develop. Div.
U.S. Agr. Res. Serv., ARS-71-28-4, 1 p. June 1967. [Processed]
- 2217 ● **Review Articles on Oilseed Crops Research. A List of Publications for 1966**
North. Util. Res. Develop. Div.
U.S. Agr. Res. Serv., ARS-71-29-5, 2 pp. June 1967. [Processed]
- 2218 ● **Computer Program for Calculation of Amino Acid Analysis**
[JAMES F. CAVINS and MENDEL FREIDMAN]
North. Util. Res. Develop. Div.
U.S. Agr. Res. Serv., CA-71-31, 30 pp. May 1967. [Processed]

Three programs are described for calculating amino acid analysis data. The general program, described in detail, is appropriate for most analyses. Two special programs are included for standardization runs and for short column analyses. All types of analysis may be computed with these three programs, written in Fortran IV language for an IBM 1130 computer.

The total number of peaks that can be handled is 30, including 12 unknown. These values, as well as other features of the program, may be readily modified according to need by changing the appropriate Fortran statements.

- 2219 ● **Aflatoxin G₁ Uptake by Cells of *Flavobacterium aurantiacum***
E. B. LILLEHOJ, A. CIEGLER, and H. H. HALL
Can. J. Microbiol. 13(6): 629-633. June 1967

Aflatoxin G₁ was removed from liquid cultures by growing and resting cells of *Flavobacterium aurantiacum* NRRL B-184. In inoculated culture media containing toxin levels of 7.5 p.p.m. and above, there was a protracted growth lag which was subsequently overcome; toxin removal then occurred, concomitant with growth. Only a few cells demonstrated aberrant morphological forms when cultured

in the presence of aflatoxin G₁. A comparison of the effects of aflatoxin G₁ with B₁ on growth and morphology showed that B₁ was distinctly more toxic. During a 4-hour incubation period, 330 µg. of aflatoxin G₁ was removed per 1×10^{13} resting cells. Preincubation of resting cells with aflatoxin B₁ did not interfere with subsequent uptake of G₁.

- 2220** • **Chemisorptive Substrate to Purify Air to a Flame-Ionization Detector**
R. L. HOFFMANN, G. R. LIST, and C. D. EVANS
J. Gas Chromatogr. 5(7): 383. July 1967

A short, heated precolumn containing silver-nitrate-impregnated alumina offers a means by which all signal-producing contaminants may be totally

removed from any air supply used to feed oxygen to a flame-ionization detector.

- 2221** • **Separation of Conjugated Methyl Octadecadienoate and Trienoate Geometric Isomers by Silver-Resin Column and Preparative Gas-Liquid Chromatography**
E. A. EMKEN, C. R. SCHOLFIELD, V. L. DAVISON, and E. N. FRANKEL
J. Amer. Oil Chem. Soc. 44(7): 373-375. July 1967

Silver-resin column chromatography, preceded by preparative gas-liquid chromatography to remove unconjugated esters, has been used to separate conjugated methyl octadecadienoates into *cis,cis*-,

cis,trans-, and *trans,trans*-isomers and also methyl eleostearate into α - and β -isomers in 91 to 100% purity.

- 2222** • **Densitometric Measurement of Aflatoxin**
R. E. PETERSON, A. CIEGLER, and H. H. HALL
J. Chromatogr. 27(1): 304-307. April 1967

An accurate method for determining aflatoxin concentration on thin-layer chromatographic plates was developed for modifying a low-cost dark-room densitometer. Water was substituted for chloroform in the aflatoxin reference standard to eliminate

concentration resulting from solvent evaporation. This substitution provides a stable standard solution which, after initial calibration, retains its rated concentration over long periods even under everyday use.

- 2223** • **Sensory Evaluation of Soy Flour**
HELEN A. MOSER, C. D. EVANS, R. E. CAMPBELL, A. K. SMITH, and J. C. COWAN
Cereal Sci. Today 12(7): 296, 298-299, 314. July 1967

Investigations on the flavor of soy flour show that a taste panel can efficiently measure the intensity of flavor in soybeans and soybean products; that it is possible to characterize the different flavors occurring

in soybeans; and that a panel can detect differences in soybeans or differences in flours caused by various processing methods.

- 2224** • **Preparation and Characterization of 1,3:4,6-Di-O-Chloroethylidenegalactitol**
H. B. SINCLAIR and WILLIAM J. WHEADON
Carbohydr. Res. 4(4): 292-297. June 1967

When D-galactitol (dulcitol) is reacted with chloroacetaldehyde diethyl acetal in concentrated hydrochloric acid, a di-O-chloroethylidene-D-galactitol results. This product, on reaction with excess *p*-toluenesulfonyl chloride in pyridine, gives an extremely acid-stable di-O-chloroethylidene-di-O-tolylsulfonylgalactitol, which on acetolysis in boiling

acetic anhydride-acetic acid containing sulfuric acid, cleaves and gives a moderate yield of 1,3:4,6-tetra-O-acetyl-2,5-di-O-*p*-tolylsulfonylgalactitol. Identification of this tetra-O-acetyl-di-O-*p*-tolylsulfonylgalactitol supports the structure of 1,3:4,6-di-O-chloroethylidenegalactitol for the original diacetal.

- 2225** • **Full-Fat Soy Flour by a Simple Process for Villagers**
 G. C. MUSTAKAS, W. J. ALBRECHT, G. N. BOOKWALTER, and
 E. L. GRIFFIN, Jr.
 North. Util. Res. Develop. Div.
 U. S. Agr. Res. Serv., ARS-71-34, 11 pp. August 1967

Food shortages among the developing nations have led to efforts to develop low-cost protein foods based on crops that can be grown in these countries. The Northern Division has taken part in a research program, supported by the Agency for International Development, to improve the processing of soybeans for foods.

One part of this research was to find a simple hand process for villages where skilled labor, electric

power, and steam cannot be had. A process that uses only simple equipment was developed. With this equipment six men can make 136 kg. (300 lb.) of soy flour in an 8-hr. day. Operation can be changed from hand to mechanical by wind, water, animal, or other available power source. A production of 136 kg. (300 lb.) per day will supply half the daily need for protein of more than 1,600 adults.

- 2226** • **Biosynthesis of D-Mannitol from D-Glucose by *Aspergillus candidus***
 K. L. SMILEY, M. C. CADMUS, and PATRICIA LIEPINS
 Biotechnol. Bioeng. 9(3): 365-374. July 1967

Mannitol has long been known as a product of glucose metabolism by some strains of *Aspergillus*. Apparently no concerted effort has been made to develop a practical fermentation process to make mannitol. Work at the Northern Division has shown that nearly all strains of white *Aspergillus* produce significant amounts of mannitol; many strains of black *Aspergillus* also have this characteristic. *Aspergillus candidus* NRRL 305 is an exceptionally good mannitol producer. Studies on a fermentation process were conducted in 20-liter stainless steel

fermentors, without baffles. Czapek-Dox medium, modified by addition of corn meal, yeast extract, and enzymatically hydrolyzed casein, was the most satisfactory medium tested. Suitable increments of glucose were fed daily to the fermentors. The duration of the fermentation was from 10 to 16 days. The effects of agitation, aeration, temperature, and pH of the medium were studied. Under optimal conditions, yields of mannitol approached 50% of the glucose consumed.

- 2227** • **Traditional Fermented Foods**
 C. W. HESSELTINE and HWA L. WANG
 Biotechnol. Bioeng. 9(3): 275-288. July 1967

For centuries, diverse plant and animal materials have been fermented by various bacteria, yeasts, and fungi to make excellent foods. The kinds of microorganisms used in traditional fermentation are restricted to a relatively few genera, including *Aspergillus*, *Rhizopus*, *Mucor*, *Actinomucor*, *Monascus*, *Saccharomyces*, *Neurospora*, *Acetobacter*, *Bacillus*, and *Lactobacillus*. The two principal advantages of food fermentations over other processes are to add flavor and to prevent spoilage. Fermented fish is a common food in the Orient and may have been the first product made by fermentation. Flavor is especially important in vegetable diets based on bland

foods such as rice. Shoyu, the best known oriental food fermentation, is widely used as a flavoring agent. Besides this fermentation, there are a large number of additional ones not so well known outside the Orient, whose products serve as seasoning or flavoring agents. Miso and natto are prepared from soybeans in Japan. Sufu is a cheeselike product made from soybean milk in China. Tempeh and onjom are Indonesian foods prepared from soybeans and peanuts, respectively. These food fermentations are discussed with emphasis on how they are produced and the flavor is formed.

- 2228 • Starch Xanthides in Linerboard: A Continuous Wet-End Process**
 G. E. HAMERSTRAND, M. E. CARR, B. T. HOFREITER, and C. E. RIST
 Tappi 50(8): 98A-100A. August 1967

New methods are described that permit continuous closed-system incorporation of starch xanthides into paper and board furnishes to improve wet- and dry-strength properties. Continuous application techniques, rather than batch operations, are employed. It is demonstrated that insoluble starch xanthides, formed by oxidative crosslinking of the xanthates, can be prepared in a continuous reactor and metered into the papermaking furnish.

evaluated. Dry-strength improvements up to 70% over untreated control boards were reached without adversely affecting furnish properties, including drainage. Also, crush resistance was improved considerably without loss of folding endurance. The xanthides not only produce a degree of permanent wet strength comparable to that given by synthetic wet-strength resins, but also permit easy repulping of dry broke in alkaline medium.

Linerboards with levels of starch xanthide addition of from 2.5 to 15% have been prepared and

- 2229 • Subcellular Structure of Endosperm Protein in High-Lysine and Normal Corn**
 M. J. WOLF, U. KHOO, and H. L. SECKINGER
 Science 157(3788): 556-557. August 1967

Optical microscopy shows that the protein network in endosperm cells of normal corn is composed of an amorphous matrix in which are embedded granules averaging about 2μ in diameter. These granules are rich in zein as demonstrated by their solubility in 80% ethanol. High-lysine corn, with

submicroscopic granules clearly resolved only in the electron microscope, has a much lower content of zein than normal corn. The small size of subcellular protein granules in high-lysine maize as compared with normal corn correlates with the reported difference in zein content of the two types of corn.

- 2230 • Chromatographic Silica Gel: Surface Area Determined by Adsorption**
 R. L. HOFFMANN, D. G. McCONNELL, G. R. LIST, and C. D. EVANS
 Science 157(3788): 550-551. August 1967

The surface area of silicic acid, a form of silica gel, has been determined by adsorption of methanol from a benzene solvent. The method

is straightforward, uses inexpensive apparatus, and should be applicable to other particulate adsorbents.

- 2231 • Yarn Sizing Market for Cereal Starch**
 CLARENCE A. MOORE¹
 (¹USDA Econ. Res. Serv., Peoria, Ill.)
 Cereal Sci. Today 12(8): 318-320, 344. August 1967

Evaluated are changes in the market for yarn-sizing material that occur as a consequence of changes in textile fabrics. Both trends and directions of their influence are summarized. Of the four negative and five positive influences identified, some exert more influence than others. Population and

per capita income are, perhaps, more stable and predictable than other factors in which the whims of fashion dominate. The starch manufacturer can better anticipate the demand for his product in yarn sizing by watching trends in textile use.

- 2232 • Fatty Acid Composition of *Ephedra campylopoda* Seed Oil**
R. KLEIMAN, G. F. SPENCER, F. R. EARLE, and I. A. WOLFF
Chem. Ind. (31): 1326–1327. August 1967

Analysis of the methyl esters of *Ephedra campylopoda* seed oil fatty acids revealed several unusual components. After their isolation by both preparative gas-liquid and thin-layer chromatography, these acids were identified by ozonolysis as 18:1¹¹ (6.2%), 18:2^{5,11} (2.0%), 20:1¹³ (0.1%), 20:2^{5,11}

(1.2%), 20:3^{5,11,14} (5.4%), 20:3^{11,14,17} (2.2%), and 20:4^{5,11,14,17} (21.9%). The ozonolysis procedure involved interruption of the reaction at several stages before completion to gain information on the location of internal double bonds of trienes and tetraenes.

- 2233 • Rapeseed Meal Autolysis. Formation of Diastereomeric (2*R*)-1-Cyano-2-Hydroxy-3,4-Epithiobutanes from Progoitrin**
M. E. DAXENBICHLER, C. H. VanETTEN, W. H. TALLENT, and I. A. WOLFF
Can. J. Chem. 45(17): 1971–1974. September 1967

When defatted seed from *Brassica napus* L. var. Regina II (a rapeseed) was autolyzed, its major thioglucoside (progoitrin) underwent degradation analogous to that for *epi*-progoitrin in *Crambe abyssinica* seed meal. Depending on the conditions, (*R*)-1-cyano-2-hydroxy-3-butene and the diastereomeric forms of (2*R*)-1-cyano-2-hydroxy-3,4-epithiobutane were

formed in autolyzed *B. napus* meal instead of (*S*)-goitrin. The configuration at the chiral center containing the hydroxyl is assigned on the basis of known data. The configuration at carbon 3 of the episulfides is predicted on the basis of optical rotatory dispersion data.

- 2234 • Silica Gel Catalyzed Detritylation of Some Carbohydrate Derivatives**
JACOB LEHRFELD
J. Org. Chem. 32(8): 2544–2546. August 1967

Methyl 2,3,4-tri-*O*-acetyl- α -D-glucopyranoside and 1,2,3,4-tetra-*O*-acetyl- β -D-glucopyranose were prepared in 81 and 87% yields, respectively, from methyl 2,3,4-tri-*O*-acetyl-6-*O*-trityl- α -D-glucopyranoside and 1,2,3,4-tetra-*O*-acetyl-6-*O*-trityl- β -D-

glucopyranose. A column of silica gel was used as the acidic detritylation catalyst and it also served as an adsorbent for the chromatographic separation of the reaction products.

- 2235 • Soybeans and Corn Join Forces in Food!**
R. J. DIMLER
Soybean Dig. 27(12): 50–53. September 1967

The opportunities and progress in bringing corn and soybean protein together in foods, to give nutritious products at low cost, are described briefly. Modified specifications for CSM (combination of corn meal, defatted soy flour, and dry-skim-milk solids,

known as Blended Food Product, Formula No. 2) are discussed, as well as a Village Process for making full-fat soy flour and a fermentation method for making cereal-soya tempeh.

2236 • Rigid Urethane Foam Extended with Starch

FLORENCE L. BENNETT, F. H. OTEY, and C. L. MEHLTRETTER
 J. Cell. Plast. 3(8): 369–373. August 1967

In studying the incorporation of starch and dextrin as extenders in rigid urethane foam, starch, an amine polyol, and a polymeric isocyanate proved to be the preferred system. Not only were costs reduced significantly by this system, but also fire-resistance was increased substantially over polyether urethane foam without fire-retardant additives.

Formulation studies, cost analysis, and foam properties are reported. Addition of 10 to 40% starch to a urethane foam system yields self-extinguishing foam having many properties equivalent to those of nonextended foam. Compressive strength is lower and weight loss during humid aging is greater than for nonextended foam.

2237 • Odor Evaluation of Fatty Methyl Esters Purified as Urea Adducts

G. R. LIST, R. L. HOFFMANN, HELEN A. MOSER, and C. D. EVANS
 J. Amer. Oil Chem. Soc. 44(8): 485–487. August 1967

Volatile oxidative cleavage products present in distilled fatty methyl esters make them unsuitable starting-materials for odor evaluation studies. Sensory evaluation of treated and untreated esters shows that crystallization with urea, removes undesirable odor constituents which result from autoxidation, metal-

catalyzed oxidation, light exposure, and distillation. The method is simple and by clathrate formation gives, in high yields, pure fatty esters, the fatty acid composition of which appears unaltered from the original material.

2238 • Ornithine-Containing Lipid in *Rhodospirillum rubrum*

J. A. DePINTO
 Biochim. Biophys. Acta 144(1): 113–117. August 1967

An ornithine-containing lipid that lacks phosphorus has been observed in *Rhodospirillum rubrum*. [^{14}C]Ornithine is incorporated into lipid during growth. Formation of ornithine lipid does not seem

to be related to the synthesis of bacteriochlorophyll. Arginine repressed the formation of the ornithine lipid, but at the same concentration it repressed ornithine transcarbamylase twice as much.

2239 • A Facile Route to *trans* Cyclic Carbonates of Sugars

W. M. DOANE, B. S. SHASHA, E. I. STOUT, C. R. RUSSELL, and C. E. RIST
 Carbohydr. Res. 4(6): 445–451. August 1967

Five-membered cyclic carbonates are formed when vicinal *trans*-hydroxyl groups in D-glucopyranosides are treated with ethyl chloroformate in the presence of triethylamine. With these reagents were prepared methyl 4,6-O-benzylidene- α -D-glucopyranoside 2,3-carbonate, methyl 2,6-di-O-(methyl-

sulfonyl)- α -D-glucopyranoside 3,4-carbonate, and methyl 4-O-(ethoxycarbonyl)-6-(O-*p*-tolylsulfonyl)- α -D-glucopyranoside 2,3-carbonate. In contrast, when pyridine is the base present, only acyclic carbonates are formed.

- 2240 • Pentane from Thermal Decomposition of Lipoxidase-Derived Products**
C. D. EVANS, G. R. LIST, AMI DOLEV, D. G. McCONNELL, and
R. L. HOFFMANN
Lipids 2(5): 432-434. September 1967

Thermal decomposition of 13-hydroperoxyoctadeca-9,11-dienoic acid yields hydrocarbons as part of the scission products. Pentane is formed predominately

and practically to the exclusion of all other short-chain hydrocarbons.

- 2241 • Solvent Effects in Reactions of Amino Groups in Amino Acids, Peptides, and Proteins with α,β -Unsaturated Compounds**
MENDEL FRIEDMAN
J. Amer. Chem. Soc. 89(18): 4709-4713. August 1967

The reaction rates of amino groups in structurally different amino acids, peptides, and proteins with α,β -unsaturated compounds were studied in a medium consisting of 50% pH 8.4 buffer-50% dimethyl sulfoxide (DMSO) and were compared to analogous rates in an aqueous buffer. The presence of DMSO in the aqueous buffer resulted in a variable rate enhancement directly related to the pK_2 values of the amino groups. A plot of the logarithm of the ratio of second-order rate constants determined in the mixed solvent system to that in the aqueous buffer versus pK_2 linear. The straight line is described by the

relationship $R = 0.855 pK_2 - 6.505$. Rates in the mixed solvent system are more sensitive to changes in basicities of amino groups than corresponding rates determined in aqueous buffers. Additional studies were carried out on the influence of several variables on rates. The results are rationalized in terms of participation of aprotic solvents in acid-base equilibria, stabilization of ground and transition states, and hydrogen-bonding interactions. The configuration and conformation of a protein appear to be significant in governing relative reactivities of its amino groups.

- 2242 • Determination of Petroselinic Acid by Microreactor Chromatography**
R. KLEIMAN, V. L. DAVISON, F. R. EARLE, and H. J. DUTTON
Lipids 2(4): 339-341. July 1967

The microreactor-ozonolysis technique was applied to the quantitative determination of the relative amounts of petroselinic and oleic acids in seven Umbelliferae seed oils. The operation was easy and rapid. Results were excellent in tests on ester mixtures of known composition. When used on

esters prepared from Umbelliferae seed oils, the method gave results comparable with those by another procedure, also described, which combines thin-layer chromatography with either gas-liquid chromatography or ultraviolet spectrophotometry.

- 2243 • Search for New Industrial Oils. XIV. Seed Oils of Labiatae**
J. M. HAGEMANN, F. R. EARLE, I. A. WOLFF, and A. S. BARCLAY¹
(¹USDA Crops Research Div., Beltsville, Md.)
Lipids 2(5): 371-380. September 1967

Seed of 194 species in 56 genera of Labiatae, representing 6 of the 8 subfamilies, were analyzed for oil and protein and for fatty acid composition of the oil. The oils are diverse and include some that contain up to 70% oleic, 79% linoleic, or 72% linolenic acids. An allenic function occurs in a third of the samples from the subfamily Stachyoideae and

in the one sample analyzed from the Prasioideae. A method for determining the allene was devised. Oils from *Teucrium* species contain *trans* unsaturation in unidentified components. Oils from two *Lamium* species have both allenic and *trans* unsaturation. Two species of *Thymus* appear to produce hydroxy acids.

- 2244** • **Mechanism of the Ninhydrin Reaction. II. Preparation and Spectral Properties of Reaction Products from Primary Aromatic Amines and Ninhydrin Hydrate**
 MENDEL FRIEDMAN
 Can. J. Chem. 45(19): 2271–2275. October 1967

Reaction products of ninhydrin with *p*-aniline, *p*-methyl-, *p*-methoxy-, and *p*-chloroanilines and with 2-aminopyridine do not form Ruhemann's purple (λ_{max} 570 m μ) under conditions of the ninhydrin

reaction. It is postulated that the failure to form this chlorophore is due to the unfavorable energetics of the subsequent steps because aromaticity of the aryl groups is lost during these transformations.

- 2245** • **Corn Dry-Milling: Pretempering Low-Moisture Corn**
 O. L. BREKKE
 Cereal Chem. 44(5): 521–531. September 1967

Dry-milling characteristics of low-moisture corn (ca. 14% and under) as determined by milling in a Beall degerminator were improved by use of a pre-temper ahead of a conventional temper. A pre-

tempering step increased the moisture content of the corn and made the conventional temper more effective, largely through a reduction in number of stress cracks formed during subsequent tempering.

- 2246** • **Interaction Between Wheat Proteins and Dextrans**
 R. W. JONES and STIG R. ERLANDER
 Cereal Chem. 44(5): 447–456. September 1967

Previous studies showed that certain dextrans alter the mixing curves of a flour-water dough, whereas others have no effect. This work has been extended to include a greater number of dextrans. In addition, the interaction of wheat proteins and dextrans in solution has been examined. In solutions of 0.01 *M* acetic acid, some dextrans will interact with gluten, gliadin, and glutenin. The interaction produces either turbidity or a precipitate and is con-

centration dependent. At a constant carbohydrate concentration, turbidity increases to a maximum as the protein concentration is increased. As the protein concentration is increased beyond the critical point, turbidity falls to zero. Not all dextrans or fractions of a given dextran react to the same degree; some do not interact at all. The effect of other polysaccharides on gluten solutions was also studied.

- 2247** • **Bacilliform Mutants of *Rhodospirillum rubrum***
 J. W. NEWTON
 Biochim. Biophys. Acta 141(3): 633–636. August 1967

A class of rod-shaped mutants was isolated from the spiral bacterium *Rhodospirillum rubrum*. Chemical

analysis indicated no major differences in composition of the cell walls of parent and mutant strains.

- 2248 • Dextran Bibliography. Part A: Patents on Production and Use of Native Dextrans, Partially Degraded Dextrans, and Their Derivatives**
 ALLENE JEANES
 North. Util. Res. Develop. Div., U.S. Agr. Res. Serv., ARS-71-36, 92 pp.
 September 1967 [Processed]

This bibliography classifies more than 700 patents from 26 countries under 9 categories: Production of native dextrans in growing cultures; enzymic synthesis of native and clinical-size dextrans; degradation of dextrans by dextranases; other methods for production of dextrans in clinical, intermediate, and low molecular-size ranges; special procedures for purifying and stabilizing clinical dextrans and their solutions; industrial uses of dextrans; food uses of

dextrans and their derivatives; pharmaceutical applications of dextrans and their derivatives; and production and industrial use of dextran derivatives.

The coverage of U. S. patents is essentially complete through December 1966; that of foreign patents is less so because of inaccessibility of sources. Abstracts of listed patents are not provided in the bibliography.

- 2249 • Inhibition of Deoxyribonucleic Acid Synthesis in *Flavobacterium aurantiacum* by Aflatoxin B₁**
 E. B. LILLEHOJ and A. CIEGLER
 J. Bacteriol. 94(3): 787-788. September 1967

The effect of various concentrations of aflatoxin B₁ on macromolecular synthesis by *Flavobacterium aurantiacum* was investigated. Growth of the organism is inhibited by the toxin. Addition of 50 µg./ml. of B₁ to a synthetic growth medium containing 2.0×10^9 exponentially growing cells blocked DNA synthesis immediately, whereas protein and RNA accumulation continued. Nucleic acids were determined by extraction of the cells with 0.5 N perchloric acid, followed by assay of the extract for DNA by the diphenylamine reaction and for RNA by the orcinol test. After a pellet from the perchloric acid treatment was dis-

solved in 1 N NaOH, the solubilized protein was determined by Lowry's Folin method. Following 8 hours of incubation in the growth medium containing 50 µg./ml. aflatoxin B₁, the RNA and protein synthesis of the cells was inhibited less than 25%, whereas production of DNA was completely blocked. DNA was extracted from the cells and incubated with aflatoxin B₁. Preliminary tests showed no detectable shift in the B₁ spectrum during incubation with DNA. Since there was no change, the toxin does not appear to react with the nucleic acid *in vitro*.

- 2250 • Origin and Behavior of Flour Proteins**
 JOSEPH S. WALL
 Bakers Dig. 41(5): 36-42, 44. October 1967

This review covers current information on how proteins develop in a wheat kernel and presents

ideas on how proteins attain their characteristic properties so essential to baking quality.

- 2251 • Cationic Linseed Oil Emulsion Paints**
 L. H. PRINCEN and J. A. STOLP
 J. Paint Technol. 39(513): 616-620. October 1967

Quaternary ammonium salts are effective emulsifying and dispersing agents in formulating linseed oil emulsion paints. Such paints can be prepared with extremely low concentrations of emulsifiers and dis-

persants at essentially neutral pH values. These paints exhibit good shelf stability, rapid film dry, and low water sensitivity.

2252 • Extracellular Lipids of YeastsFRANK H. STODOLA, MARIA H. DEINEMA,¹ and J. F. T. SPENCER²(¹ Agricultural University, Wageningen, The Netherlands; ² Prairie Regional Laboratory, Saskatoon, Saskatchewan, Can.)

Bacteriol. Rev. 31(3): 194–213. September 1967

The yeasts, which until recently were known to form mainly intracellular triglycerides of a very ordinary sort, have now been shown to excrete a number of unusual lipids. Polyol esters of 3-hydroxy fatty acids from *Rhodotorula* species, sophorosides of hydroxy fatty acids from *Candida b'goriensis* and *Torulopsis apicola*, acetylated sphingosines from

Hansenula ciferri, and hydroxylated C₂₂ acids from a yeast resembling *Torulopsis fujisanensis*, have all been observed and characterized. Yeastlike organisms also produce similar extracellular lipids. Little is known about the biogenesis of these compounds and nothing about where they are synthesized in the yeast cell.

2253* • Recent Studies on the Flavour Stability of Soybean Oil

J. C. COWAN

In "Manufacture and Distribution of Foods," ed. James Muil Leitch, Vol. IV, Proc. First Int. Congr. Food Sci. Technol., London, 1962, p. 751 (summary). [1967]

A review of the history of research on flavour stability of soybean oil placed emphasis on recent work. Research at the Northern Division on possible precursors of volatile cleavage products and their identification was reviewed, as well as hydrogenation

of soybean oil and linoleate to give more stable oils, lower *trans*, and higher linoleate contents; the "hidden" oxidation in vegetable oils, the effect of tocopherol in vegetable oils; and the relation of citric acid to synergism.

2254 • Gas-Liquid Radiochromatogram Plotting

PAUL J. THOMAS

Catalog of Computer Programs for Data Processing of Counting Data, Downers Grove, Ill. 1967

A point-to-point plot is made of liquid scintillation counting data obtained from serial fractions collected from a gas chromatograph. Values at every 1/100 inch are calculated by interpolation between

points; from these an average plot is made from 2, 3, or 4 runs of the same sample. (Packard Computer Program Library No. 03671)

2255 • Fractionation of Flours from New Pacific Northwest Wheats

A. C. STRINGFELLOW and A. J. PEPLINSKI

Northwest. Miller 274(8): 12–13. August 1967

Tests showed that flour from the 1965 crop of Sib 7 (Nugaines) soft white winter wheat could be satisfactorily fractionated by fine grinding and air

classification. New Burt-Itana crosses also responded to fractionation satisfactory for hard wheat.

2256 • Publications and Patents from Research on New Crops by Utilization Research and Development Divisions, 1966

North. Util. Res. Develop. Div.

U.S. Agr. Res. Serv., CA-71-30-2, 10 pp. November 1967 [Processed]

- 2257** • **Digital Computer Program for Calculating Selectivities of Hydrogenation Catalysts**
R. O. BUTTERFIELD and H. J. DUTTON
J. Amer. Oil Chem. Soc. 44(10): 549–550. October 1967

Linolenate and linoleate selectivities of hydrogenation catalysts are determined by a digital computer program that solves the kinetic equations of

consecutive first-order reactions. The program described is applicable to any initial oil or degree of hydrogenation.

- 2258** • **Aflatoxins and Other Mycotoxins**
C. W. HESSELTINE
Health Lab. Sci. 4(4): 222–228. October 1967

Although not an exhaustive review, this is a comprehensive summary of present knowledge of the mycotoxins. The problems of mycotoxins in agri-

culture include the growing plant, the seed, storage, effect on animals, and processing of foods.

- 2259** • **Note on a Water-Based Aflatoxin Standard**
ROBERT PETERSON and A. CIEGLER
J. Ass. Offic. Anal. Chem. 50(5): 1201–1202. October 1967

Aflatoxins are quantitatively analyzed routinely on thin-layer chromatographic plates by comparing the fluorescence of unknowns with the fluorescence of a standard aflatoxin solution spotted in different amounts. The usual chloroform standard evaporates

readily unless elaborate precautions are taken. Substituting water for CHCl_3 provides a stable standard solution which, after initial calibration, retains its rated concentration over long periods even with daily use.

- 2260** • **Reduction of Protein Disulfide Bonds by Sodium Hydride in Dimethyl Sulfoxide**
L. H. KRULL and MENDEL FRIEDMAN
Biochem. Biophys. Res. Commun. 29(3): 373–377. November 1967

A system is described to reduce disulfide bonds in proteins under aprotic conditions. Rates of reduction were followed by alkylation of the generated sulfhydryl groups with acrylonitrile, isolation of the modified proteins by dialysis, and amperometric

titration of the remaining disulfide and sulfhydryl groups. Results indicate that sodium hydride in dimethyl sulfoxide will reduce protein disulfides to sulfhydryl groups with minimal side reactions.

- 2261** • **A Search for New Fiber Crops. X. Effect of Plant Maturity and Location of Growth on Kenaf Composition and Pulping Characteristics**
T. F. CLARK, S. C. UHR, and I. A. WOLFF
Tappi 50(11): 52A–56A. November 1967

This investigation is part of a program to determine the merits of kenaf (*Hibiscus cannabinus*) as a fibrous raw material for papermaking. Kenaf in northern Florida and central Illinois was harvested at various stages of growth to compare effects of location and plant maturity on compositional and pulping characteristics. Cellulose and pentosan contents of the stalks, as well as pulp yields, were higher for the Florida-grown material. Arithmetic averages for length and width of bast and woody fibers decreased between 90 and 120 days after planting, at both locations, but did not change significantly after 120 days.

Little change in yield of screened sulfate pulp (Florida, 53–55%; Illinois, 44–47%) or in pulp quality occurs in the processing of green kenaf stalks harvested after 120 days from planting. Pulp yield from field-dried Illinois kenaf, harvested approximately 3 months after killing frost, increased to 50%. Considerable latitude may be exercised in the time of harvest for pulp preparation. Decisions as to timing of harvests will be governed largely by economics. That is, urgency of a mill's need for raw material should be weighed against the per-acre yields of dry matter, which continued to increase with plant maturation.

2262 • Migration of Thiolthiocarbonyl Groups of Methyl α -D-Glucopyranoside Xanthates

D. TRIMNELL, W. M. DOANE, C. R. RUSSELL and C. E. RIST
Carbohyd. Res. 5(2): 166–175. October 1967

If similar reactant ratios are used, xanthation of methyl α -D-glucopyranoside parallels xanthation of starch. Degrees of substitution in the 0.3-0.4 range were achieved, and changes in distribution from secondary to primary positions were observed. Synthesis of the individual, isomeric, xanthate salts of methyl α -D-glucopyranoside, and treatment of each with 18% sodium hydroxide, showed that the 2-, 3-,

and 6-xanthate salts rearranged to mixtures in each of which the 6-isomer predominated. Evidence is presented suggesting that the 2-isomer migrates intramolecularly to the 6-isomer by way of the 3-isomer. However, observation of the presence of minor proportions of polyxanthates in these mixtures suggests that intermolecular migration of thiolthiocarbonyl groups also occurs.

2263 • Reactions of Carbohydrate *trans*-Fused Cyclic Carbonates

E. I. STOUT, W. M. DOANE, B. S. SHASHA, C. R. RUSSELL, and C. E. RIST
Tetrahedron Lett. (45): 4481–4482. November 1967

The *trans*-fused cyclic carbonate group of methyl 4,6-O-benzylidene- α -D-glucopyranoside 2,3-carbonate (I) readily undergoes ring opening when treated with either an alcohol, a thiol, or an amine. Reaction of I

with methanol, α -toluenethiol, and piperidine gave the corresponding methoxycarbonyl, (α -toluenethio)-carbonyl, and (1-piperidyl)carbonyl derivatives of I in excellent yields.

2264 • Publications and Patents of the Northern Utilization Research and Development Division, January–June 1967

North. Util. Res. Develop. Div.
U.S. Agr. Res. Serv., Unnumb. Pub., 47 pp. [July 1967]

2265 • Toxic Fungi Isolated from Tall Fescue

A. C. KEYL,¹ J. C. LEWIS,¹ J. J. ELLIS, S. G. YATES, and H. L. TOOKEY
(¹ West. Util. Res. Develop. Div., Albany, Calif.)
Mycopathol. Mycol. Appl. 31(3–4): 327–331. April 1967

Extracts of cold-grown common molds isolated from tall fescue forage produce toxic effects on rabbit skin and hemorrhagic death in mice. A mixture of *Cladosporium cladosporioides* and *Fusarium nivale* produced ruminal atony in a sheep. The clinical

findings in the sheep show some similarity to those of cattle on toxic fescue pastures. Further work to determine the role of fungal toxins in the etiology of fescue foot in cattle is underway.

- 2266 • Boron-Selective Ion Exchange Resins Containing D-Glucitylamino Radicals**
C. L. MEHLTRETTER, F. B. WEAKLEY and C. A. WILHAM
Ind. Eng. Chem., Prod. Res. Develop. 6(3): 145-147. September 1967

New boron-sorbing ion-exchange resins were prepared by extensively aminating a chloromethylated styrene-divinylbenzene copolymer with 1-amino-1-deoxy-D-glucitol, 1,1'-iminobis(1-deoxy-D-glucitol) and 1,4-piperazinediylbis(1-deoxy-D-glucitol). Column studies showed that the resins were approximately equivalent in boron capacity to a commercial ion-exchange resin prepared with 1-deoxy-1-(methyl-amino)-D-glucitol. The piperazine-derived quaternary ammonium resin had reduced boron capacity in the

presence of sodium chloride because of its high basicity and attendant salt-splitting action. Boron sorption of all resins was lowered in the presence of acidic magnesium chloride. Divinylbenzene cross-linking in all the resins was the same, and mesh size was approximately uniform. Comparison of boron capacity was therefore valid when similar flow rates of boric acid solution were used. All resins were readily regenerated with 10% sulfuric acid.

- 2267 • Diester Plasticizers from Mixed Crambe Dibasic Acids**
H. J. NIESCHLAG, W. H. TALLENT, I. A. WOLFF, W. E. PALM,¹ and L. P. WITNAUER¹
(¹East. Util. Res. Develop. Div., Wyndmoor, Pa.)
Ind. Eng. Chem., Prod. Res. Develop. 6(4): 201-204. December 1967

Twelve diesters prepared from a mixture of dibasic acids and individual alcohols having from 4 to 10 carbon atoms were evaluated as plasticizers for poly(vinyl chloride). The mixed dibasic acids, predominantly brassylic and azelaic, were obtained by ozonolysis of unsaturated fatty acids from crambe, a high-erucic acid oilseed. Monobasic acids produced by ozonolysis were easily removed by distillation. Use of the mixture of dibasic acids to make the "azela-brassylic" plasticizers requires neither isolation of

individual fatty acids before ozonolysis nor separation of dibasic acids afterwards. All the azela-brassylics with six or fewer carbon atoms in the alcohol moiety were compatible; all compatible plasticizers, except for the dicyclohexyl ester, contributed excellent low-temperature flexibility to poly(vinyl chloride). Bis(2-methylpentyl) azela-brassylic had much better light stability than the bis(2-ethylhexyl) sebacate control and compared favorably in all other properties with this commercial, low-temperature plasticizer.

- 2268 • Anionic Graft Polymerization of Methyl Acrylate to Protein Functional Groups**
L. H. KRULL and MENDEL FRIEDMAN
J. Polym. Sci., Part A-1, 5(10): 2535-2546. October 1967

Graft polymerization of methyl acrylate to functional groups in proteins was studied with model compounds and with whole gluten proteins. Polymerization was carried out in the presence of sodium hydride or sodium in dimethyl sulfoxide. Initiation proceeds by an anionic mechanism, and the rate-determining step is the production of the initially formed carbanion. The rate of disappearance of methyl acrylate was followed via gas chromatography. Amino acid analyses indicated that the functional groups of the amino acids, as well as the peptide

bonds, were acting as the initiation sites in proteins. Reaction rates of the functional groups were determined on model compounds in the presence of sodium and sodium hydride. With both the model compounds and the proteins, polymerization was initially rapid and then leveled off, although rates depended on the concentration of activator and acrylate. Methoxyl group analyses of modified model compounds and proteins indicated that from 5 to 10 methyl acrylate residues were introduced per reactive site.

- 2269** • **Alkyl Vinyl Esters of Brassylic (Tridecanedioic) Acid**
 SHU-PEI CHANG, THOMAS K. MIWA, and IVAN A. WOLFF
 J. Polym. Sci., Part A-1, 5(10): 2547-2556. October 1967

Brassylic acid was partially esterified at 77° C. in toluene solution with either ethyl, 2-methylpentyl, or nonyl alcohol and with *p*-toluenesulfonic acid used as catalyst. Half-esters were isolated from the respective reaction mixtures in yields of 28, 34, and 32% after reaction times of 2, 6, and 8 hours. Both recovered brassylic acid and byproduct dialkyl ester were successfully used as starting materials in subsequent esterifications. Consequently, conversion of starting materials to half-ester would be increased in a process that involved continuous recycling of by-products. Alkyl hydrogen brassylates were vinylated

at 165° C. for 8 hours with acetylene at 360 p.s.i.g. The zinc salt generated *in situ* from zinc oxide served as catalyst and toluene as solvent. Yields were 80-88% and purities of products were 94-95%. Samples of 2-methylpentyl vinyl brassylate and nonyl vinyl brassylate of much higher purity were obtained by preparative gas-liquid chromatography or molecular distillation. Physical properties and experimental conditions for gas-liquid chromatographic analyses of both the alkyl hydrogen and alkyl vinyl brassylates are reported.

- 2270** • **Crosslinking of Starch Xanthate. I. Reaction with Polyethylenimine**
 G. G. MAHER, C. R. RUSSELL, and C. E. RIST
 Die Stärke 19(11): 354-358. November 1967

Reactions between starch xanthate of 0.11-0.55 degree of substitution (D.S.) and polyethylenimines of 3,000 and 100,000 molecular weight have been studied in aqueous medium. Generally, reaction mixtures get viscous and become rigid gels. Viscosity development depends primarily on the starch xanthate D.S., the molecular weight of the polyethylenimine, and the ratio of polyethylenimine to xanthate groups. Less significant factors are the pH of the reaction and

the amount of water present. Reaction products can be precipitated by drowning in water and then lowering the pH or by drowning in ethanol. Elemental analysis and spectral absorptions of the precipitated products indicate a thiourethan structure containing 1.75 to 2.5 ethylenimine units per original xanthate group, which would equal a crosslinking bridge having an average length of 3.5 to 5.0 ethylenimine units.

- 2271** • **X-Ray Diffraction of Oriented Amylose Fibers. II. Structure of V Amyloses**
 H. F. ZOBEL, A. D. FRENCH, and M. E. HINKLE
 Biopolymers 5(9): 837-845. October-November 1967

Oriented amylose fibers in the V form were prepared and subjected to x-ray analysis. Unit cells and the probable space group of $P2_12_12_1$ were determined for the V anhydrous and V hydrate forms of amylose; the analysis confirms previous predictions of these structures based on x-ray powder patterns.

Chain folding in V amyloses is discussed in view of crystallographic evidence and folding experiments conducted with space-filling models. Reported also is evidence for amylose helices having diameters intermediate between 13.0 and 13.7 Å.

2273 • Analysis for Geometrical and Positional Isomers of Fatty Acids in Partially Hydrogenated Fats

C. R. SCHOLFIELD, V. L. DAVISON, and H. J. DUTTON
J. Amer. Oil Chem. Soc. 44(11): 648–651. November 1967

A liquid chromatographic procedure for fractionation and analysis of methyl esters from fats is described. First, esters are separated by liquid chromatography on a partially vulcanized rubber column into trienoate, dienoate, monoenoate-palmitate, and stearate fractions. The monoenoate-palmitate fraction is separated by liquid chromatography on a silver-saturated cation exchange resin into palmitate, *trans*

monoenoate, and *cis* monoenoate fractions. Double bond positions in *trans* and *cis* monoenoates are located by ozonization and gas chromatography of fragments. This separation procedure requires less time and uses simpler apparatus with smaller samples than a previously described method based on counter-current distribution. Data from analyses of two liquid oils and four shortenings are included.

2274 • Silicic-Acid Column Chromatography: Adsorption Mechanism and Solvent Systems

R. L. HOFFMANN, D. G. McCONNELL, and C. D. EVANS
J. Amer. Oil Chem. Soc. 44(11): 637–640. November 1967

The relationship was investigated between chromatographic characteristics of silicic-acid columns and electrophilicity-geometry of their adsorbed solvent. Data show that it is possible to prepare columns of almost identical separation characteristics

from a variety of dissimilar solvents. Consideration must be given to electron distribution and molecular geometry of the adsorbed solvent with which sample components must compete during chromatography.

2275 • Silicic Acid Column Chromatography: Parameters for a Binary Solvent System

D. G. McCONNELL, R. L. HOFFMANN, G. J. ELMAN, and C. D. EVANS
J. Amer. Oil Chem. Soc. 44(11): 641–644. November 1967

The elution characteristics of methanol-benzene solvent systems were determined by separating a mixture of polar and nonpolar fatty methyl esters by liquid chromatography on silicic acid columns. A series of curves were plotted showing the relationship between the elution volume of each component and methanol concentration of the stationary phase. The resulting graphs serve as a basis for predicting elution conditions for separating other polar materials. Adsorption isotherms were plotted from equilibrium studies of methanol-benzene systems on silicic acid. Methanol concentrations of the effluents from

various columns were determined by refractive index. An abrupt concentration change occurs in the methanol content of the effluent when the mobile solvent is either richer or poorer in methanol than the equilibrated solvent. Elution position of this abrupt change depends upon the concentration of methanol in both the mobile and the stationary phases. The procedure has been rigorously standardized because small variations in the amount of methanol on the column create large differences in elution volumes.

- 2276** • **Synthesis of Vinyl *Threo*-9,10-*Threo*-12,13-Tetrahydroxystearates**
 JOHN L. O'DONNELL, L. E. GAST, J. C. COWAN, W. J. DeJARLAIS, and
 G. E. McMANIS
 J. Amer. Oil Chem. Soc. 44(11): 652-655. November 1967

Methyl esters from vernonia oil containing *cis*-12,13-epoxy-*cis*-9-octadecenoate were reacted with acetone in the presence of a boron trifluoride catalyst to yield *trans*-12,13-*O*-isopropylidene-9-ene derivative I. Epoxidation of the unsaturation followed by reaction with acetone gave the isomeric *trans,trans*-di-*O*-isopropylidene derivatives III of 9,10:12,13-tetrahydroxystearates. The carboxylic acids of

III were converted to vinyl esters and subsequent hydrolysis of the isopropylidene groups with boric acid produced vinyl *threo*-9,10-*threo*-12,13-tetrahydroxystearates. By the same sequence of reactions monoepoxidized methyl linoleate yielded an optically inactive derivative which had identical refractive index, infrared spectrum, and gas-liquid chromatographic data to III from vernonia methyl esters.

- 2277** • **Effect of Temperature on Production of Aflatoxin on Rice by *Aspergillus flavus***
 W. G. SORENSON, C. W. HESSELTINE, and ODETTE L. SHOTWELL
 Mycopathol. Mycol. Appl. 33(1): 49-55. October 1967

The influence of temperature on formation of aflatoxin on solid substrate (rice) by *Aspergillus flavus* NRRL 2999 has been studied in some detail. The optimum temperature for production of both aflatoxin B₁ and G₁ under the conditions employed is 28° C. Comparable yields of B₁ were obtained at 32° C., but considerably less G₁ was produced at this temperature. Both B₁ and G₁ were found in lesser amounts at temperatures above 32° C., and the aflatoxin content of rice incubated at 37° C. was low (300-700 p.p.b.) even though growth was good.

Reducing the temperature from 28° to 15° C. resulted in progressively less aflatoxin, but 100 p.p.b. of B₁ was detected in cultures incubated 3 weeks at 11° C. No aflatoxin was produced at 8° C.

The ratio of the four aflatoxins is affected by temperature. At the lower temperatures, essentially equal amounts of aflatoxin B₁ and G₁ were produced, whereas at 28° C., approximately four times as much B₁ was detected as G₁. At the higher temperatures, relatively less G was formed, until at 37° C., less than 10 p.p.b. was detected.

- 2278** • **Plant Seeds as Protein Sources for Food or Feed. Evaluation Based on Amino Acid Composition of 379 Species**
 C. H. VanETTEN, W. F. KWOLEK,¹ J. E. PETERS, and A. S. BARCLAY²
 (¹USDA Biometrical Serv., Peoria, Ill.; ²USDA Crops Research Div., Beltsville, Md.)
 J. Agr. Food Chem. 15(6): 1077-1089. November-December 1967

Amino acid analyses are reported for the first time on seeds from 165 plant species. For evaluation, the data were combined with results reported earlier on 214 other species. Based on the FAO provisional pattern for selected nutritionally essential amino acids, the seed proteins were generally adequate in leucine, phenylalanine, threonine, and valine. The mean methionine content for 35 species of Compositae, and the mean lysine content for 92 species of Cruciferae, and for 70 species of Leguminosae, were

above the mean for all species. Percentages of methionine and isoleucine in seeds from most plant families were below FAO requirements. Seeds from Gramineae (including the common cereal grains) were low in lysine. Seed proteins from a number of species have a better pattern of essential amino acids than many crop seed sources. Many seed meals contained toxic or deleterious substances that must be inactivated or removed before the meals can be considered for food or feed.

- 2279 • An Evaluation of the Oxidative and Flavor Stability of Stored Soybean Oils**
 L. A. BAUMANN,¹ D. G. McCONNELL, HELEN A. MOSER, and C. D. EVANS
 (¹ USDA Market Quality Res. Div., Washington, D.C.)
 J. Amer. Oil Chem. Soc. 44(11): 663–666. November 1967

Results of 4-year storage tests are reported for crude and refined soybean oils held in 50-gallon drums under conditions simulating field tank operations. Oil samples were examined at regular intervals for peroxide development, dimer formation, and flavor stability. Once-refined oils stored in filled drums without breathers showed lower peroxide values and lower dimer contents than oil stored in

full drums with breathers. Relationships are significant not only between storage peroxide values and dimer contents, but also each of these with flavor scores. Once-refined soybean oil held under large field-tank storage conditions would not be expected to reach peroxide levels of 60 until after 3 to 4 years, even in warm areas.

- 2280 • A Rapid Method To Measure Glucoamylase Activity**
 MARTIN C. CADMUS
 In "Automation in Analytical Chemistry, Technicon Symposium 1966," pp.
 656–657. New York. 1967

Glucoamylase (α -1,4-glucan glucohydrolase, an enzyme commonly produced by many strains of *Aspergillus*) converts starch to glucose in high yields. An automatic procedure has been developed to determine more rapidly the amount of glucoamylase in many different culture filtrates of the *Aspergillus*.

Substrate used was a 0.5% solution of buffered starch (pH 4.25) containing sodium chloride. Glucose was determined colorimetrically by utilizing the potassium ferricyanide oxidation-reduction reaction. Good duplication of standard curves is realized at sampling rates of either 40 or 60 samples per hour.

- 2281 • New Amino Acids Derived From Reactions of ϵ -Amino Groups in Proteins with α,β -Unsaturated Compounds**
 JAMES F. CAVINS and MENDEL FRIEDMAN
 Biochemistry 6(12): 3766–3770. December 1967

Reduced bovine serum albumin, reduced whole wheat gluten, and polylysine were reacted with acrylonitrile and with methyl acrylate. Amino acid analyses of hydrolyzates of the modified proteins revealed that the formation of two new compounds was accompanied by a decrease in lysine. Evidence indicates that the new amino acids are ϵ -N,N-bis(β -carboxyethyl)-L-lysine and ϵ -N-(β -carboxyethyl)-L-lysine. Kinetic studies on the hydrolysis of ϵ -N,N-bis(β -cyanoethyl)-L-lysine under both acidic and basic

conditions indicate that this amino acid undergoes decyanoethylation and its hydrolysis product undergoes decarboxyethylation. Amino acid analysis of hydrolyzates of modified proteins does not always reveal the ratio of mono- to disubstituted derivatives actually formed during the reaction of ϵ -amino groups of lysine side chains with α,β -unsaturated compounds. The original ratio may be altered during hydrolysis in favor of the monosubstituted derivative.

- 2282** • **Separation of Aflatoxins by Two-Dimensional Thin-Layer Chromatography**
R. E. PETERSON and A. CIEGLER
J. Chromatogr. 31(1): 250-251. November 1967

Two-dimensional chromatography permits better separation of aflatoxins B₁, B₂, G₁, and G₂, re-

vealing the presence of additional fluorescing compounds.

- 2283** • **Characterization of the Acetic Acid-Insoluble Fraction of Wheat Gluten Protein**
J. E. CLUSKEY and R. J. DIMLER
Cereal Chem. 44(6): 611-619. November 1967

The acetic acid-insoluble protein in wheat gluten was extracted in good yield by using a hydrochloric acid-2-chloroethanol solvent after acetic acid extraction. Moving boundary electrophoresis showed the isolate to have components with mobilities similar to those of glutenin and faster moving protein. Starch-gel electrophoresis of the insoluble protein after reduction and alkylation demonstrated several components of high electrophoretic mobility

similar to that of reduced water-soluble proteins and lesser amounts of constituents resembling reduced glutenin. The protein insoluble in acetic acid appears to be a mixture of high-molecular-weight constituents consisting in part of a variety of polypeptides intermolecularly linked through disulfide bonds and resembling most closely those of the water-soluble proteins of the wheat flour.

- 2284** • **Purification of the 11S Component of Soybean Protein**
A. C. ELDRIDGE and W. J. WOLF
Cereal Chem. 44(6): 645-652. November 1967

Solubilities of the 2S, 7S, 11S, and 15S components in the cold-insoluble fraction of soybean protein were determined in sodium acetate-sodium chloride buffers at pH 4.6, 0° to 2° C. Solubility of some components varied considerably with ionic strength. Extraction of the cold-insoluble fraction at 25° C. with pH 4.6, 0.5 ionic strength buffer, followed by cooling to 0° to 2° C., yielded 3 to 4 mg. protein per milliliter having a composition of 8, 21,

and 70% for the respective 2S, 7S, and 11S components. When these solubles were diluted to pH 4.6, 0.3 ionic strength, and cooled to 0° to 2° C., a precipitate formed. The precipitate contained from 5 to 8% 7S component and from 92 to 95% 11S component; it was devoid of 2S and 15S material. Further fractionation of this precipitate on crosslinked dextran resulted in an 11S fraction, which appeared to be homogeneous.

- 2285** • **Cryoprecipitation of Soybean 11S Protein**
W. J. WOLF and DAYLE ANN SLY
Cereal Chem. 44(6): 653-668. November 1967

Cooling a concentrated aqueous extract of defatted soybean meal causes cryoprecipitation of protein consisting primarily of the 11S ultracentrifugal component. Factors affecting cryoprecipitation

studies were meal: water extraction ratio, extraction temperature, rate of cryoprecipitation, pH, and addition of mercaptoethanol, *N*-ethylmaleimide, sucrose, and salts.

- 2286 • Lipid Distribution in the Protein Matrix of Wheat Endosperm as Observed by Electron Microscopy**
H. L. SECKINGER and M. J. WOLF
Cereal Chem. 44(6): 669–674. November 1967

Free and bound lipids were extracted from hard red spring wheat flour. Electron micrographs of the protein matrix show the effect of various solvent extractions. Free lipids were distributed throughout the protein matrix rather than in distinct bodies. Bound lipids, however, appeared in small inclusions

throughout the protein matrix and presumably are remnants of cytoplasmic structures occurring in endosperm cells at maturity. No difference was observed in the protein matrix which would suggest that it could be separated into wedge protein and a lipid-rich, fibrous, adhering protein fraction.

- 2287 • (S)-1,2-Diacyl-3-acetins: Optically Active Triglycerides from *Euonymus verrucosus* Seed Oil**
R. KLEIMAN, R. W. MILLER, F. R. EARLE, and I. A. WOLFF
Lipids 2(6): 473–478. November 1967

The seed oil of *Euonymus verrucosus* Scop., family Celastraceae, contains more than 90% 1,2-diacyl-3-acetins (monoacetotriglycerides). The constituent triglyceride acids, other than acetic, are the usual long-chain fatty acids.

Thin-layer chromatography (TLC), infrared (IR), and hydrolysis with pancreatic lipase indicate that the acetic acid is esterified exclusively on the outer glycerol carbon atoms. The isolated mixed monoacetotriglycerides exhibit optical rotation caused

by asymmetry of the central glycerol carbon atom. Comparison with synthetic products of known configuration shows that the natural material is essentially all (S)-1,2-diacyl-3-acetin.

TLC, IR, and gas-liquid chromatography analyses indicate the presence of monoacetotriglycerides in seven other species of Celastraceae and five species in three other plant families in amounts from 13 to 98%.

- 2288* • Physical Properties of Amylose, Retrograded Amylose, and Periodate-Oxidized Amylose as Studied by Ultracentrifugal Molecular Weight Determinations**
STIG R. ERLANDER and H. L. GRIFFIN
Die Stärke 19(5): 139–144. May 1967

Molecular weights of dent corn amylose before and after periodate oxidation to the 20% level were determined by light scattering and by ultracentrifuge techniques. A correlation between light scattering and ultracentrifugal molecular weights of amylose is best when the partial specific volume used in ultracentrifugal molecular weight determination is $\bar{V} = 0.66$. The results indicate that retrogradation of amylose changes the value of $\bar{V}$ because of a change in its conformation. From ultracentrifuge studies the ratio of Z-average to weight-average molecular weights ($\bar{M}_z/\bar{M}_w$) is approximately 1.5 for amylose. This ratio suggests that amylose behaves as linear A-B

condensation polymer. Although Trautman plots for periodate-oxidized amylose (20% oxidation level) and its parent amylose give the same values for $\bar{M}_w$ and $\bar{M}_s$ for the two products, the plots differ in slope at low C/C^0 values. It is shown that this difference must be due to a nonuniform change in either the average segment length ($\bar{R}_i^2/M_i$) or the Flory universal constant ϕ when amylose is oxidized. The results are further proof that amylose exists as a helix below pH 12. In other words, this nonuniform change for $\bar{R}_i^2/M_i$ and/or ϕ with a change in the molecular weight of amylose molecules must be due to the stiff helical conformation of such molecules.

2289* • Crambe Vegetable Oil

IVAN A. WOLFF

In "Encyclopedia of Basic Materials for Plastics," eds. Herbert R. Simonds and James M. Church, pp. 129–130. New York. 1967

Crambe seed oil has threefold utility as a raw material for the plastics industry. The glyceride oil can serve as a lubricant or, after vulcanization with sulfur, as a rubber additive. Erucic acid, a major

constituent acid derived from the oil, in the form of an amide serves as a plasticizer or slip agent. Thirteen carbon monomers for preparing condensation polymers can be synthesized from erucic acid.

2290 • New Polymers Through Reaction of *trans*-Carbonates of Glycosides with Polysaccharides

W. M. DOANE, E. I. STOUT, B. S. SHASHA, C. R. RUSSELL, and C. E. RIST
Carbohydr. Res. 5(3): 366–367. November 1967

Methyl 4,6-*O*-benzylidene- α -D-glucopyranoside 2,3-carbonate and 2,3-thionocarbonate were substi-

tuted with starch via a carbonate bridge in the presence of triethylamine as the catalyst.

2291 • A Novel Method for Preparation of Some Sugar Carbonates

B. S. SHASHA, W. M. DOANE, C. R. RUSSELL, and C. E. RIST
Carbohydr. Res. 5(3): 346–348. November 1967

A novel method was developed for the preparation of 1,2-*O*-isopropylidene- α -D-glucofuranose 5,6-carbonate and 1,2:5,6-di-*O*-isopropylidene-D-mannitol 3,4-carbonate by reaction of bis(*O*-ethyl thiocarbonyl)

disulfide with 1,2-*O*-isopropylidene- α -D-glucofuranose and 1,2:5,6-di-*O*-isopropylidene-D-mannitol, respectively.

2292 • Configuration of the Pyruvic Acid Ketals, 4,6-*O*-Linked to D-Glucose Units, in *Xanthomonas campestris* Polysaccharide

P. A. J. GORIN,¹ T. ISHIKAWA,¹ J. F. T. SPENCER,¹ and J. H. SLONEKER
(¹ Prairie Regional Laboratory, Saskatoon, Saskatchewan, Can.)
Can. J. Chem. 45(17): 2005–2008. September 1967

Configuration of the 4,6-*O*-(1-carboxyethylidene)-D-glucopyranosyl units in the exocellular polysaccharide from *Xanthomonas campestris* NRRL B-1459 has been determined. In the most stable conformation the C-methyl group like that in the

4,6-*O*-(1-carboxyethylidene)-D-galactopyranosyl units in the exocellular polysaccharide from *Corynebacterium insidiosum* is equatorial to the 1,3-dioxane ring. However, the ketal carbon atom of the glucose derivative has the opposite configuration.

CONTRACT AND GRANT RESEARCH PUBLICATIONS

[Report of research work done by an outside agency under contract with the U.S. Department of Agriculture and supervised by the Northern Utilization Research and Development Division.]

- 185-C • Comparisons of Cells, Refractile Bodies, and Spores of *Bacillus popilliae***
 BRIJ M. MITRUKA,¹ RALPH N. COSTILOW,¹ S. H. BLACK,² and R. E. PEPPER¹
¹Michigan State University, East Lansing, and ²Baylor University, Houston, Texas
 J. Bacteriol. 94(3): 759-765. September 1967

- 186-C • Effect of Nitrogen Fertilization on the Amino Acid Composition and Distribution in Sorghum Grain**
 D. H. WAGGLE, C. W. DEYOE, and F. W. SMITH
 Kansas State University, Manhattan
 Crop. Sci. 7(4): 367-368. July-August 1967

[Report of research work done by an outside agency under a grant from the U.S. Department of Agriculture and supervised by the Northern Utilization Research and Development Division.]

- 16-G • Nuclear Magnetic Resonance Studies on Acetylated 1-Thioaldopyranose Derivatives**
 CHARLES V. HOLLAND,¹ DEREK HORTON,¹ MARTHA J. MILLER,¹ and NORMAN S. BHACCA²
¹The Ohio State University, Columbus, and ²Louisiana State University, Baton Rouge
 J. Org. Chem. 32(10): 3077-3086. October 1967

- 17-G* • Synthesis of 3-O-(2-Acetamido-3,4,6-tri-O-acetyl-2-deoxy-β-D-glucopyranosyl)-N-(2,4-dinitrophenyl)-DL-threonine Methyl Ester and Study of Its Stability Toward Basic Reagents**
 J. R. VERCELLOTTI, RITA FERNANDEZ, and CHING JEN CHANG
 Marquette University, Milwaukee, Wis.
 Carbohydr. Res. 5(1): 97-101. September 1967

- 18-G*** • **A 4-Hydroxy-L-proline Glycoside of 2-Amino-2-deoxy-D-glucose**
J. R. VERCELLOTTI and E. K. JUST
Marquette University, Milwaukee, Wis.
Carbohyd. Res. 5(1): 102-106. September 1967
- 19-G*** • **The Synthesis of 2-Carboxy-6-nitrobenzimidazole 1-Oxides by Intramolecular Oxidation of α -(2,4-Dinitrophenylamino)- $\alpha\beta$ -unsaturated Acyl Derivatives**
A. E. LUETZOW and J. R. VERCELLOTTI
Marquette University, Milwaukee, Wis.
J. Chem. Soc., Sec. C(18): 1750-1758. 1967
- 20-G** • **Viscoelastic Properties of Plasticized Amylose Films**
SHIGEO NAKAMURA and A. V. TOBOLSKY
Princeton University, Princeton, N. J.
J. Appl. Polymer Sci. 11(8): 1371-1386. August 1967
- [Report of research work supported with funds provided by the U.S. Department of Agriculture under the authority of U.S. Public Law 480, 83rd Congress, and sponsored by the Northern Utilization Research and Development Division.]
- 157-F** • **Studies on Starches of High Amylose-Content. Part VIII. The Effect of Low Temperature on the Interaction of Amylomaize Starch with Iodine: A Unique Characterization**
G. K. ADKINS and C. T. GREENWOOD
University of Edinburgh, Edinburgh, Scotland
Carbohyd. Res. 3(2): 152-156. December 1966
- 158-F** • **Structure of Branched Poly- α -amino Acids in Dimethylformamide. I. Light Scattering**
N. ELIEZER and A. SILBERBERG
The Weizmann Institute of Science, Rehovoth, Israel
Biopolymers 5(1): 95-104. January 1967
- 159-F** • **Multiple Hemagglutinins in Soybean**
HALINA LIS, CELIA FRIDMAN, NATHAN SHARON, and EPHRAIM KATCHALSKI
The Weizmann Institute of Science, Rehovoth, Israel
Arch. Biochem. Biophys. 117(2): 301-309. November 1966

- 160-F** ● **Studies on Cause of Color Reversion of Edible Soybean Oil and Its Prevention. Part II. Tocored as a Precursor of Color Reversion of Soybean Oil**
MAMORU KOMODA, NORIJI ŌNUKI, and ICHIRO HARADA
Sugiyama Chemical Research Institute, Tokyo, Japan
Agr. Biol. Chem. (Tokyo) 31(4): 461–469. April 1967
- 161-F** ● **Structure of Branched Poly- α -Amino Acids in Dimethylformamide. II. Viscosity, Sedimentation, and Diffusion**
N. ELIEZER and A. SILBERBERG
The Weizmann Institute of Science, Rehovoth, Israel
Biopolymers 5(1): 105–122. January 1967
- 162-F** ● **The Itaconic and Itatartaric Acid Formation by UV and Gamma Irradiated Isolates of *Aspergillus terreus* NRRL 1960**
JADWIGA JAKUBOWSKA, HELENA OBERMAN, ALINA MAKIEDOŃSKA,
and TERESA FLORIANOWICZ
Technical University, Łódź, Poland
Acta Microbiol. Pol. 16(1): 53–68. 1967
- 163-F** ● **Quantitative Paper Chromatography of Sugars of the Cotyledon, Hull, and Hypocotyl of Soybeans of Selected Varieties**
SIN'ITIRŌ KAWAMURA
Kagawa University, Takamatsu, Japan
Tech. Bull. Fac. Agr., Kagawa Univ. (Kagawa Daigaku Nogakubu Gakuzyutu Hokoku) 18(2): 117–131. March 1967
- 164-F** ● **Quantitative Paper Chromatography of Sugars of Defatted Soybean Meal**
SIN'ITIRŌ KAWAMURA
Kagawa University, Takamatsu, Japan
Tech. Bull. Fac. Agr., Kagawa Univ. (Kagawa Daigaku Nogakubu Gakuzyutu Hokoku) 18(2): 132–137. March 1967
- 165-F** ● **Isolation and Determination of Sugars from the Cotyledon, Hull, and Hypocotyl of Soybeans by Carbon Column Chromatography**
SIN'ITIRŌ KAWAMURA and MINORU TADA
Kagawa University, Takamatsu, Japan
Tech. Bull. Fac. Agr., Kagawa Univ. (Kagawa Daigaku Nogakubu Gakuzyutu Hokoku) 18(2): 138–141. March 1967

- 166-F • Separation of Sugars from Soybeans by Centrifugal Chromatography**
 SIN'ITIRÔ KAWAMURA, HIROSHI SUZUKI, and MASAKAZU IMAYOSI
 Kagawa University, Takamatsu, Japan
 Tech. Bull. Fac. Agr., Kagawa Univ. (Kagawa Daigaku Nogakubu Gakuzyutu Hokoku) 18(2): 142-146. March 1967
- 167-F • Effect of Autoclaving on Sugars of Defatted Soybean Flakes from Selected Varieties**
 SIN'ITIRÔ KAWAMURA, MINORU TADA, and NORIKO IRIE
 Kagawa University, Takamatsu, Japan
 Tech. Bull. Fac. Agr., Kagawa Univ. (Kagawa Daigaku Nogakubu Gakuzyutu Hokoku) 18(2): 147-153. March 1967
- 168-F • Assimilation of Radioactive Orthophosphate by the Yeast *Candida utilis* at a Temperature Higher than Optimal (45° C.). Isolation, Identification, and Specific Activity of Phosphate Esters Soluble in Cold Trichloroacetic Acid**
 T. SAVIOJA and J. K. MIETTINEN
 Biochemical Research Institute, Helsinki, Finland
 Acta Chem. Scand. 20(9): 2444-2450. 1966
- 169-F • Isolation and Identification of the Acid-Soluble Phosphorus Compounds of Yeast**
 T. SAVIOJA and J. K. MIETTINEN
 Biochemical Research Institute, Helsinki, Finland
 Acta Chem. Scand. 20(9): 2435-2443. 1966
- 170-F • On Trehalose Metabolism in Yeast**
 T. SAVIOJA and J. K. MIETTINEN
 Biochemical Research Institute, Helsinki, Finland
 Acta Chem. Scand. 20(9): 2451-2455. 1966
- 171-F • The Effects of Inhibitors and Nucleotide Base Analogues on the Assimilation of Phosphates by Yeast**
 TOIVO SAVIOJA and J. K. MIETTINEN
 Biochemical Research Institute, Helsinki, Finland
 Suomen Kemistilehti B 39(10): 197-199. 1966

- 172-F ● The Heat Stability of Pullulanase**
M. ABDULLAH, B. J. CATLEY, W. F. J. CUTHBERTSON, and W. J. WHELAN
Royal Free Hospital School of Medicine, London, England
Biochem. J. 100(1): 8P. May 1966
- 173-F ● The Mechanism of Carbohydrase Action. 11. Pullulanase, an Enzyme Specific for the Hydrolysis of Alpha-1→6-Bonds in Amylaceous Oligo- and Polysaccharides**
M. ABDULLAH, B. J. CATLEY, E. Y. C. LEE, J. ROBYT, K. WALLENFELS, and W. J. WHELAN
Royal Free Hospital School of Medicine, London, England
Cereal Chem. 43(1): 111-118. January 1966
- 174-F ● Polysaccharides of Soybeans. Part III. Extraction and Fractionation of Polysaccharides from Cotyledon Meal**
G. O. ASPINALL, R. BEGBIE, A. HAMILTON, and J. N. C. WHYTE
University of Edinburgh, Edinburgh, Scotland
J. Chem. Soc., Sec. C(11): 1065-1070. 1967
- 175-F ● Polysaccharides of Soybeans. Part IV. Partial Hydrolysis of the Acidic Polysaccharide Complex from Cotyledon Meal**
G. O. ASPINALL, I. W. COTTRELL, SYLVIA V. EGAN, I. M. MORRISON, and J. N. C. WHYTE
University of Edinburgh, Edinburgh, Scotland
J. Chem. Soc., Sec. C(11): 1071-1080. 1967
- 176-F ● Polysaccharides of Soybeans. Part V. Acidic Polysaccharides from the Hulls**
G. O. ASPINALL, K. HUNT, and I. M. MORRISON
University of Edinburgh, Edinburgh, Scotland
J. Chem. Soc., Sec. C(11): 1080-1086. 1967
- 177-F ● Estimation of Carboxyl, Sulphate & Sulphonate Groups by Direct Titrimetry**
G. VENKATESWARA RAO and K. T. ACHAYA
Regional Research Laboratory, Hyderabad, India
Indian J. Chem. 5(4): 150-152. April 1967

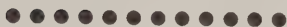
- 178-F • Structure et Synthèse de la Subunité Peptidique de la Paroi de Trois Bactéries Gram-Positif [Structure and Synthesis of Peptide Subunits from Cell Walls of Three Gram-Positive Bacteria]**
 E. BRICAS,¹ P. LEFRANCIER,¹ J. M. GHUYSEN,² E. MUNOZ,² M. LEYH-BOUILLE,² J. F. PETIT,² and H. HEYMANN²
¹Institute of Biochemistry, Orsay, France and ²University of Liège, Liège, Belgium
 The Peptides, ed. Bayermann, Proc. 6th European Symp., Amsterdam, 1966, pp. 287-292. 1967
- 179-F • Substituents on the α -Carboxyl Group of D-Glutamic Acid in the Peptidoglycan of Several Bacterial Cell Walls**
 DONALD J. TIPPER, WALTHER KATZ, JACK L. STROMINGER, and JEAN-MARIE GHUYSEN
 University of Liège, Liège, Belgium
 Biochemistry 6(3): 921-929. March 1967
- 180-F • The Peptide N^{α} -(L-Alanyl-D-isoglutaminyl)-N-(D--isoasparaginyl-L-lysyl-D-alanine and the Disaccharide N-Acetylglucosaminyl- β -1,4-N-acetylmuramic Acid in Cell Wall Peptidoglycan of *Streptococcus faecalis* Strain ATCC 9790**
 JEAN-MARIE GHUYSEN, EVANGELOS BRICAS, MELINA LEYH-BOUILLE, MARVIN LACHE, and GERALD D. SHOCKMAN
 University of Liège, Liège, Belgium
 Biochemistry 6(8): 2607-2619. August 1967
- 181-F • The Cell Wall Peptidoglycan of *Bacillus megaterium* KM. I. Studies on the Stereochemistry of α, α' -Diaminopimelic Acid**
 EVANGELOS BRICAS, JEAN-MARIE GHUYSEN, and PHILIPPE DEZÉLÉE
 University of Liège, Liège, Belgium
 Biochemistry 6(8): 2598-2607. August 1967
- 182-F • Precipitation of Arabic Acid and Some Seed Polysaccharides by Glycosylphenylazo Dyes**
 JOSEPH YARIV, HALINA LIS, and EPHRAIM KATCHALSKI
 The Weizmann Institute of Science, Rehovoth, Israel
 Biochem. J. 105(1): 1C-2C. October 1967
- 183-F • Crystallization of Linseed Oil Fatty Acids from Acetonitrile**
 ERKKI UKSILA and INKERI LEHTINEN
 University of Helsinki, Helsinki, Finland
 Acta Chem. Scand. 20(6): 1645-1650. 1966

- 184-F ● **Separation of Unsaturated Fatty Acids of Soybean and Linseed Oils by Crystallization and Subsequent Liquid-Liquid Extraction**
ERKKI UKSILA, MATTI VARESMAA, and INKERI LEHTINEN
University of Helsinki, Helsinki, Finland
Acta Chem. Scand. 20(6): 1651-1657. 1966
- 185-F ● **Fractionation of Soybean Oil Fatty Acids as Free Acids and "Acid" Sodium Soaps by Crystallization from Methanol and Acetone**
ERKKI UKSILA, INKERI LEHTINEN, and PAAVO ROINE
University of Helsinki, Helsinki, Finland
Suomen Kemistilehti B 39(10): 185-189. 1966
- 186-F ● **Factors Contributing to the Crystallization of Fatty Acids and "Acid" Soaps of Linseed Oil**
ERKKI UKSILA, INKERI LEHTINEN, and PAAVO ROINE
University of Helsinki, Helsinki, Finland
Suomen Kemistilehti B 39(10): 190-192. 1966
- 187-F ● **Studies of the Flavorous Substances in Shoyu. Part XXVII. The Production of 4-Ethylguaiaicol During Shoyu Fermentation, and Its Role for Shoyu Flavor. [In Japanese. English summary, p. 442]**
TAMOTSU YOKOTSUKA, YASUO ASAO, and TOSHIO SAKASAI
Noda Institute for Scientific Research, Noda City, Japan
J. Agr. Chem. Soc. Jap. (Nippon Nogei Kagaku Kaishi) 41(9): 442-447.
September 1967
- 188-F ● **Diploid Hybridization in a Heterothallic Haploid Yeast, *Saccharomyces rouxii***
HARUHIKO MORI and HIROSHI ONISHI
Noda Institute for Scientific Research, Noda City, Japan
Appl. Microbiol. 15(4): 928-934. July 1967
- 189-F ● **Studies on the Flavorous Substances in Shoyu. Part XXV. Flavorous Components Produced by Yeast Fermentation. [In Japanese. English summary, p. 428]**
TAMOTSU YOKOTSUKA, TOSHIO SAKASAI, and YASUO ASAO
Noda Institute for Scientific Research, Noda City, Japan
J. Agr. Chem. Soc. Jap. (Nippon Nogei Kagaku Kaishi) 41(9): 428-433.
September 1967

- 190-F ● Studies of the Flavorous Substances in Shoyu. Part XXVI. Flavorous Components Produced by Yeast Fermentation. [In Japanese. English summary, p. 434]**
 YASUO ASAO, TOSHIO SAKASAI, and TAMOTSU YOKOTSUKA
 Noda Institute for Scientific Research, Noda City, Japan
 J. Agr. Chem. Soc. Jap. (Nippon Nogei Kagaku Kaishi) 41(9): 434–441.
 September 1967
- 191-F ● Influencia de los Aditivos Antioxidantes Sobre las Características Espectrales en el Visible de los Aceites de Oliva y Soja [Influence of Antioxidant Additives on the Visible Spectral Characteristics of Olive and Soybean Oils. English summary, p. 385]**
 M. TRUYOLS and J. THOMAS
 University of Granada, Granada, Spain
 Ars. Pharm. 8(7–10): 380–385. 1967
- 192-F ● Medida por Fluorescencia de la Penetración de los Aceites en los Alimentos Fritos [Determination of Oil Penetration in Fried Foods by Means of Fluorescence. English summary, p. 209]**
 M. MONTEOLIVA, J. D. PÉREZ SOLER, C. IBÁÑEZ, and G. VARELA
 University of Granada, Granada, Spain
 Grasas Aceites (Seville, Spain) 18(4): 209–213. July–August 1967
- 193-F ● The Thermal Degradation of Starch. Part VII. Differential Thermal Analysis of Maltodextrins and of Starch and Its Components**
 C. T. GREENWOOD and HELEN E. MUIRHEAD
 University of Edinburgh, Edinburgh, Scotland
 Die Stärke 19(9): 281–285. September 1967
- 194-F ● Alcohol-Soluble Proteins of Cereal Grains**
 J. MOSSÉ
 National Institute of Agronomic Research, Versailles, France
 Fed. Proc. 25(6): 1663–1669. November–December 1966
- 195-F ● Polarography of Quinoxalines and Its Application to Carbohydrate Chemistry**
 MASANOSUKE TAKAGI, RYUICHI HOSOGAKI, and SOZABURO ONO
 University of Osaka Prefecture, Sakai, Japan
 Rev. Polarogr. (Kyoto) 14(3–6): 367–376. October 1967

- 196-F*** ● **Modificación al Método de Hanus para la Determinación del Índice de Yodo en Grasas Animales y Vegetales [A Modification of the Hanus Method for Determining Iodine Value, of Animal and Vegetable Fats]**
FRANCISCO SANCHEZ RASERO and MIGUEL MONTEOLIVA HERNÁNDEZ
University of Granada, Granada, Spain
Ars. Pharm. 5(2): 115-130. 1964
- 197-F*** ● **Estudio Comparativo de la Fritura en las Distintas Grasas Culinarias. I. Fritura de Patatas en Aceite de Soja, de Oliva y Mezcla de Ambos. Variaciones Físicas, Químicas y Nutritivas de Palatabilidad en los Aceites y en la Patata [Comparative Study of Frying in Different Coating Fats. I. Frying Potatoes in Soybean Oil, Olive Oil, and a Mixture of the Two. Physical, Chemical, and Nutritive Variations of Palatability in the Oils and the Potatoes]**
M. MONTEOLIVA, O. MOREIRAS-VARELA, F. SÁNCHEZ RASERO, J. THOMAS, M. TRUYOLS, and G. VARELA
University of Granada, Granada, Spain
An. Bromatol. 15(3): 255-340. 1963
- 198-F*** ● **Estudio Comparativo de la Fritura en las Distintas Grasas Culinarias. II. Modificaciones Químicas en la Patata y en los Aceites Durante la Fritura [Comparative Study of Frying in Different Cooking Fats. II. Chemical Changes in the Potato and in the Fats During Frying]**
F. S. RASERO and M. MONTEOLIVA
University of Granada, Granada, Spain
An. Bromatol. 17(4): 421-458. 1965
- 199-F*** ● **Estudio Comparativo de la Fritura en las Distintas Grasas Culinarias. III. Factores Físico-Químicos que Condicionan la Penetración de Grasa en los Alimentos [Comparative Study of Frying in Different Cooking Fats. III. Physico-Chemical Factors Regulating the Penetration of Fat in Food]**
M. TRUYOLS and J. THOMAS
An. Bromatol. 18(1): 5-66. 1966

July–December 1967



PATENTS

[These patents are assigned to the Secretary of Agriculture. Copies of patents may be purchased (50 cents each) from the Commissioner of Patents, U.S. Patent Office, Washington, D.C. 20231. Order by number, do not send stamps.]

Protein Glue for Southern Pine Plywood

FRANCIS B. WEAKLEY and CHARLES L. MEHLTRETTER

U.S. Patent 3,329,518. July 4, 1967

A low-cost interior-grade adhesive especially formulated for the hot-press formation of southern pine plywood comprises a borax-assisted aqueous

dispersion of soy flour, spray dried animal blood, and 1.25 to 2.5% by weight dialdehyde starch based on the combined weight of the soy flour and blood.

Derivatives of Methyl 9,9-Dimethoxynonanoate

EVERETT H. PRYDE, JOHN C. COWAN and DANNY JOE MOORE

U.S. Patent 3,330,840. July 11, 1967

Superior plasticizers for poly(vinyl chloride) are produced by selectively alcoholyzing either the acetal function or the ester function of methyl

9,9-dimethoxynonanoate or by transacetalizing the same either with ethylene glycol or with 2-methoxyethanol.

Almarcetin and Its Production by *Streptomyces albus*

MARILYN J. BACHLER, LLOYD A. LINDENFELSER, and ODETTE L. SHOTWELL

U.S. Patent 3,332,847. July 25, 1967

Almarcetin, a novel broad spectrum antibiotic complex having especially marked *in vitro* activity against the bacteria that cause crown gall and bean blight, is produced in aerobic fermentations of a unique strain of *Streptomyces albus* designated as

NRRL B-3141. The almarcetin complex, consisting of two major factors and two minor factors, is purified by adsorption on activated carbon, acidified alumina, and cation exchange with a strongly acidic resin.

Compositions for Increasing the Dispersion Stability of Titanium Dioxide Pigment

RAYMOND NOEL FAULKNER and EDWIN ENFIELD BERRY

U.S. Patent 3,343,974. September 26, 1967

The dispersion stability of rutile (TiO_2 pigment) in painters' naphtha is greatly improved by first stirring the rutile in a dilute solution of phosphory-

lated (P-acid) methyl oleate in acetone or ethylene glycol monoethyl ether and drying the rutile so treated.

Solvent for Obtaining Very High Yields of Aldehydic Products from Soybean Oil

DANNY JOE MOORE

U.S. Patent 3,349,106. October 24, 1967

Substantially theoretical yields of methyl azelaaldehyde are obtained from methyl oleate by conducting both the ozonization thereof and the catalytic hydrogenolysis of the resulting ozonides in about two parts by weight of a reaction solvent consisting of about equal parts of a C_2 - C_3 mono-

carboxylic acid and a C_2 - C_6 aliphatic or cyclic alcohol, washing a methylene chloride or diethyl ether solution of the reaction products, and isolating the desired methyl azelaaldehyde therefrom by vacuum distillation.

Disinfectant-Containing Stopper for Prolonged Aerobic Fermentations

BERNARD A. WEINER

U.S. Patent 3,352,762. November 14, 1967

The combination of (1) an improved polarographic electrode comprising a nonfouling platinum wire cathode that is exposed to the solution being tested only at the collodion-coated segment lying directly beneath a slitlike opening that replaces the resin-filled original aperture in the bevel of an encasing hypodermic needle and (2) a horizontally directed rubber stopper subassembly comprising a rubber stopper that has been bored out from both

ends to provide a pair of membrane-separated opposing wells, at least one of which has been painted with a crystal-containing solution of iodine the biocidal vapor of which is confined by a puncturable insert has permitted a continuous polarographic record of *Bacillus popilliae* growth in a prolonged aerobic fermentation wherein reinsertions of the polarographic electrode following daily restandardization did not cause contamination of the fermentation.

Pigment Dispersants Comprising Phosphonic Acid Diels-Alder Adducts of Vegetable Oil Materials

RAYMOND NOEL FAULKNER and NIRMAL SEN

U.S. Patent 3,354,104. November 21, 1967

Additions of novel Diels-Alder adducts of vinyl phosphonic acid or dichloride and isomerized edible oils or the corresponding methyl esters to phthalocyanine blue-tinted titanium dioxide alkyd paints completely inhibits flotation effects (color unevenness) that otherwise occur when the paint is applied.

The novel phosphonic acid adducts, which are characterized by the stable $-\text{P}(\text{O})(\text{OH})_2$ group, are formed by reacting from 1.0 to 1.7 equivalents of vinyl phosphonic acid or dichloride per mole of fatty material.

Alkali Isomerization of Crepenynic Acid to 8,10,12-Octadecatrienoic Acid

MARVIN O. BAGBY and KENNETH L. MIKOLAJCZAK

U.S. Patent 3,356,699. December 5, 1967

Alkali isomerization even at room temperature as with potassium-*t*-butoxide of crepenynic acid (*cis*-9-octadecen-12-ynoic acid), which is a major component of the oil of *Crepis foetida*, results successively in the nearly quantitative formation of a conjugated eneallenic intermediate; namely, *cis*-9,11,12-octadecatrienoic acid, and then on heating at 100° C. to a recoverable 2:1 mixture of *trans,cis*,

trans- and *trans,cis,cis*-8,10,12-octadecatrienoic acids, which mixture even in the absence of alkali cyclizes at about 180° C. to provide greatly improved yields of the mixed C₁₈ cyclohexadiene monocarboxylic acid isomers free of appreciable cyclic acid polymer. The isolated mixture of *trans,cis,trans*- and *trans,cis,cis*-acids would also be expected to exhibit drying oil properties similar to those of tung oil fatty acids.

Microbiological Screening Process for Aflatoxin

HARLAND R. BURMEISTER

U.S. Patent 3,360,441. December 26, 1967

A simple screening procedure for detecting the presence of aflatoxin on agricultural commodities is based on the discovery that the organisms *Bacillus megaterium* NRRL B-1368, *B. megaterium* NRRL B-1370, and *B. brevis* NRRL B-1874 are exquisitely

sensitive to aflatoxin and that when their spores are streaked on the surface of a tryptone-glucose-yeast extract agar medium, they fail to grow if the medium contains per milliliter from about 2 µg to about 6 µg of aflatoxin.

ERRATA

In the January–June 1967 List of Publications and Patents, an erroneous abstract was cited for U.S. Patent 3,312,341. The correct information should read:

Flotation Separation of Dry Milled Cereal Grain Components

LAURENCE A. WEINECKE and RONALD R. MONTGOMERY

U.S. Patent 3,312,341. April 4, 1967

Greatly improved separations of dry milled corn or sorghum into germs and endosperms are obtained in a water flotation column wherein the mixture to be separated is fed at the midpoint of the column and wherein the water moves upward from a lowly placed inlet at the critical rate of about 5.5 f.p.m. for the milled corn and about 3.8 f.p.m. for

the sorghum. Successively recycling the obtained endosperms in critically accelerated columns of water separates the grits into a more buoyant fraction containing more attached germ and a less buoyant fraction containing a smaller amount of germ and intrinsic oil.

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